OZONE, JET STREAKS AND SEVERE WEATHER

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Data from three independent observing platforms are synthesized to study the role of jet streaks in severe weather. The three data types are: a) conventional radiosondes, b) 6.7 micron water vapor imagery from the Geostationary Operational Environmental Satellite (GOES), and c) total ozone imagery from Nimbus 7. Diagnoses are then made of potential vorticity, mid-tropospheric moisture, and total ozone at and below the level of jet streaks.

Potential vorticity and total ozone distributions are both tracers of stratospheric air. Theoretically, both should respond to the transverse, vertical circulations expected in the vicinity of jet streaks. Both should increase due to the sinking above the left front quadrant of the streaks. Moisture, on the other hand, increases in the ascent under the left front quadrant.

This study shows striking agreement between the three parameters independently observed from three different observing platforms. Moreover, the three severe weather case studies suggest a unique distribution of ozone, potential vorticity and mid-tropospheric moisture relative to a jet streak. This, in turn, led to the creation of a new Ozone/Jet Streak Model which shows that the total ozone distribution provides a unique signature in the vicinity of jet streaks and permits identification of areas most likely to experience severe weather at a later time. The value of such observations to operational forecasting is discussed.